EXTRACTION OF OLEORESIN FROM *Zingiber zerumbet* RHIZOME: COMPARATIVE STUDY ON YIELD, ZERUMBONE AND CURCUMIN CONTENT

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ABSTRACT

Extraction of oleoresin involves several processing parameters that can alter the nutritional and chemical properties of the samples. Processing parameters studied in this research were blanching treatments, types of solvent and time of extraction. The effect of the processing parameters on the oleoresin yield, zerumbone and curcumin content of the Zingiber zerumbet was determined. The type of solvent was found as the most influential parameter that affects the yield of oleoresin and its zerumbone and curcumin content. Ethanol found to be the best solvent. The highest yield of oleoresin, zerumbone and curcumin was obtained after 18 hours of extraction. The processing parameters were observed to promote the increment of yield of oleoresin and zerumbone and curcumin content.

Keywords: Zingiber zerumbet oleoresin, Zerumbone, Curcumin;,Processing parameters.

INTRODUCTION

Numerous studies showed that a chemical and physical processing of plant material affect the yield and the bioactive component of the samples [1-4]. Therefore, it is crucial to select appropriate method processing to the desired result. In this research, soxhlet extraction method was used for the extraction of phyto chemical from *Zingiber zerumbet*. The processing parameters investigated are the type of the solvent (ethanol; hexane; acetone) and time of extraction (10 hour; 14 hour; 18hour).

Curcumin has been recognized as potential in herbal medicine. It is well known for its antioxidant, anti-inflammatory and antimicrobial properties. In the present study, the effect of processing parameters on the yield of oleoresin and its corresponding zerumbone and curcumin was investigated. Understanding of the effects is important to design a better process method.

MATERIALS AND METHOD

Samples

Zingiber zerumbet rhizomes were procured from local market. Samples were subjected to blanching treatment, dried and ground into powder. Extraction of oleoresin was carried out by soxhlet method. The oleoresin extracts were filtered and solvents were removed.

Preparation for Standard Zerumbone absorption graph.

A total of 5 different concentration of standard zerumbone solution was prepared which were 0.01 mg/ml, 0.005 mg/ml, 0.0025 mg/ml, 0.00125 mg/ml and 0.000625 mg/ml. The process started with first dilution 1 mg of standard zerumbone into 10ml ethanol (d1). Then 1ml from the solution further diluted with 9 ml of ethanol (d2). The next 5ml of the second solution (d2) was further diluted with 5 ml of ethanol (d3). The process of dilution was continued to d6 where each time 5 ml of previous solution was diluted with 5ml of ethanol.

Absorption of zerumbone and curcumin.

All the samples of oleoresin obtained from soxhlet extraction process were collected and were stored accordingly. Each sample collected from the process was tested using spectrophotometer to detect the presence of zerumbone and curcumin. The spectrophotometer was set to read at 248 nm. The blank reagent was placed in a quartz cuvette. Quartz cuvette was used because it works well with wavelength below 300 nm. The quartz cuvette filled with reagent blank was used as the blank standard.

Another quartz cuvette was then filled with sample with the similar solvent as reagent blank. For absorption of curcumin, a similar method was used. For curcumin determination, the glass cuvette was used and the

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spectrophotometer was set at 425 nm, as it is the wavelength used for curcumin [5,6]

RESULTS AND DISCUSSION

Figure 1 shows the absorption of standard zerumbone. From the graph, the correlation between absorption of zerumbone and zerumbone concentration is linear. The equation of straight line: Y = 18.937X.

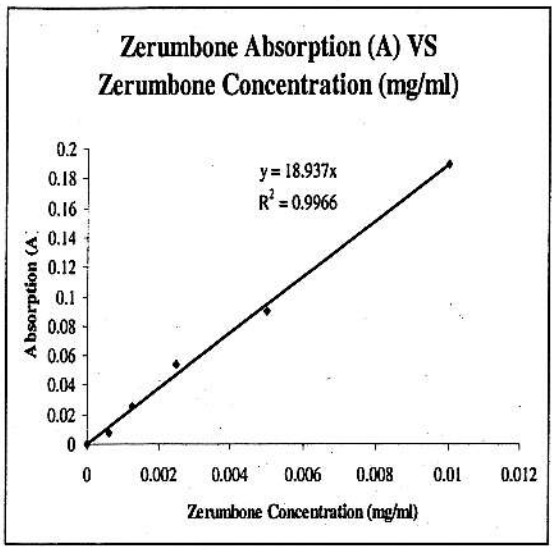

Figure 1: Graph of standard zerumbone Absorption vs. concentration

Yield of Oleoresin.

From Figure 2 and Figure 3 it was observed that the yield of oleoresin is increasing with time of extraction.

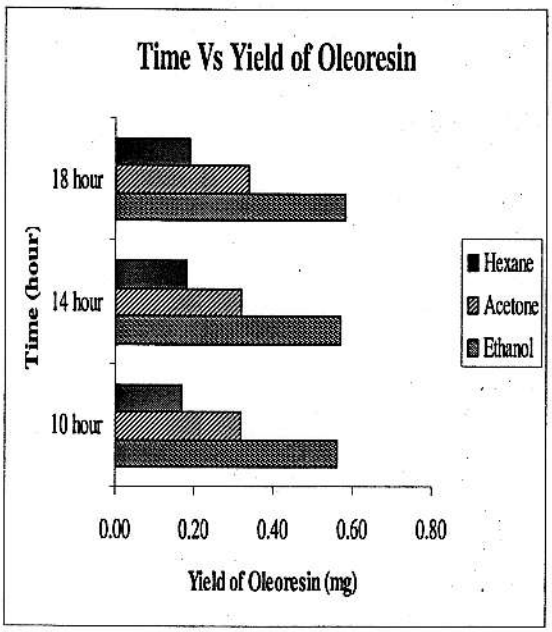

Figure 2: Graph time vs. yield of oleoresin

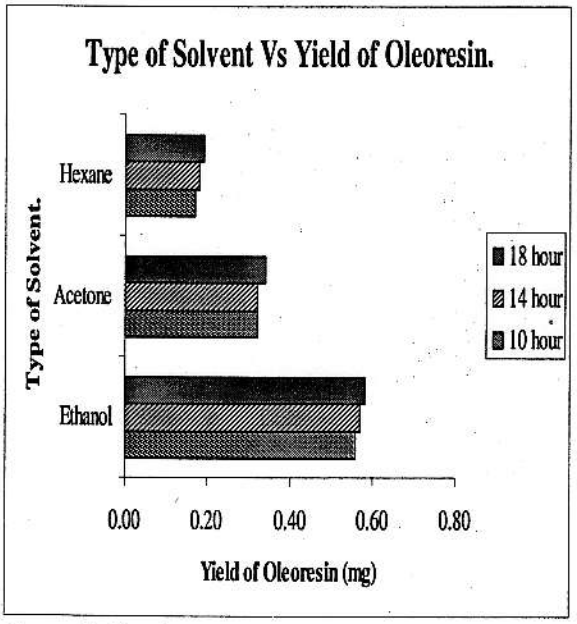

Figure 3: Graph type of solvent vs. yield of oleoresin.

The longer the period of extraction, the higher is yield of oleoresin. From the bar graphs, it can be seen that ethanol is the best solvent as it results in the highest yield of oleoresin compared with acetone and hexane. The highest yield obtained using ethanol as the solvent was 0.58 mg. Ethanol is the most polar solvent compared with the other solvents and it is probable that the oleoresin extracted is composed mainly of high polar components. It is known

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that the oleoresin of *Zingiber zerumbet* consists of 65.3% zerumbone. Zerumbone is a polar substance.

Yield of Zerumbone

In extraction, the concept of 'like dissolves like' is used as a reference. Therefore, as zerumbone is a polar substance, a polar solvent would be best used. As shown in Figure 4 and Figure 5, with solvent ethanol the highest zerumbone yield resulted as ethanol is the most polar solvent .

From Figure 4 and Figure 5, it is observed that the highest yield is obtained from 18 hours extraction. Most of the zerumbone has been extracted out from the *Zingiber zerumbet* by 10 hours extraction time, while lowest yield is obtained with hexane as it is the least polar solvent compared with the others. It can be seen that it has yet to reach maximum extraction even at 18 hours. It is likely that it will take a much longer time to reach a similar level of extraction as ethanol and acetone.

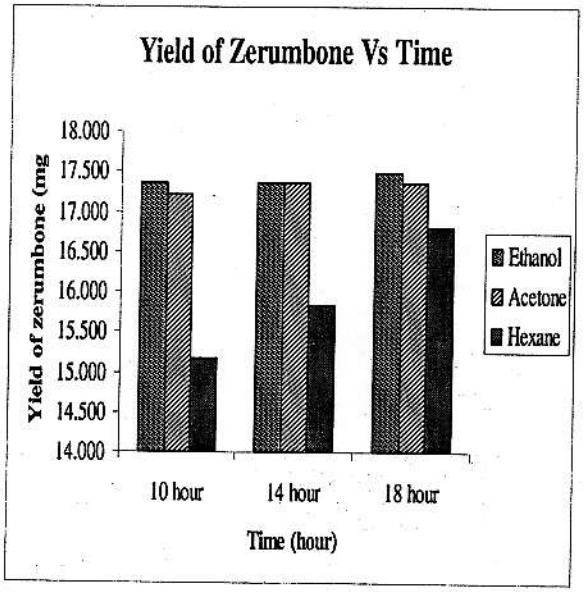

Figure 4: Graph yield of zerumbone vs. time.

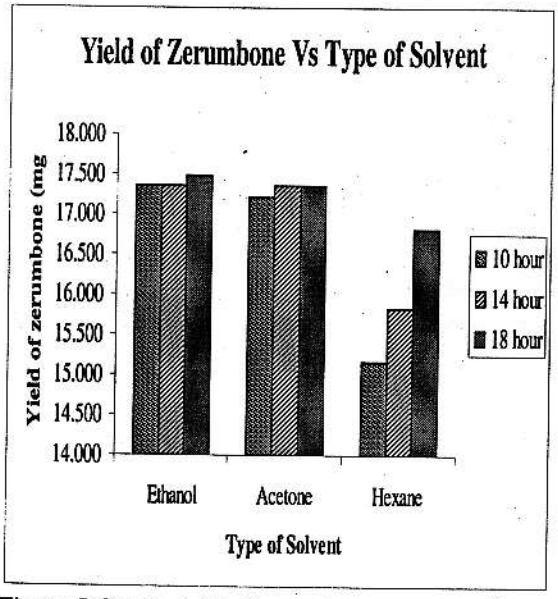

Figure 5:Graph yield of zerumbone vs. type of solvent.

Yield of curcumin

Curcumin is the compound that gives the yellow colouration to the oleoresin. The yield of curcumin from oleoresin extracted from *Zingiber zerumbet* can be related to the colour of the extract. It was found that acetone has the most intense yellowish colour. Therefore, it is likely that acetone extracts more curcumin than the other solvents.

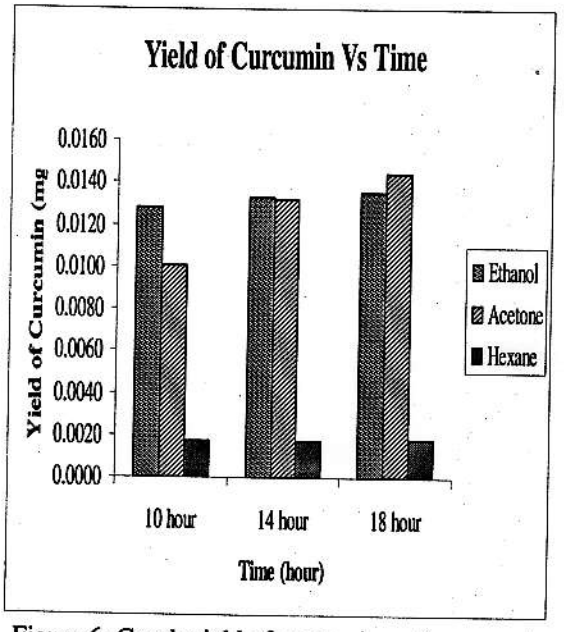

Figure 6: Graph yield of curcumin vs time.

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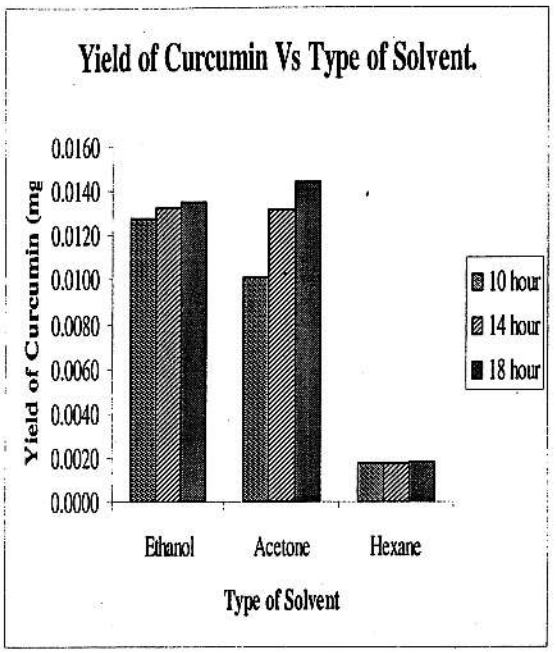

Figure 7:Graph yield of curcumin vs type of solvent.

From Figure 6 and Figure 7, the colour of oleoresin is confirmed. The highest yield of curcumin was otained within 18 hours using acetone as solvent. Although initially more yield of curcumin is obtained with ethanol than acetone in the first 10 hours, the yield of curcumin was highest with acetone as can be seen in Figure 6 and Figure 7. The lowest yield of curcumin was obtained with hexane.

CONCLUSION

The extraction time for oleoresin, curcumin and zerumbone was 18 hours . The best solvent for extraction of oleoresin and zerumbone was ethanol while for curcumin was acetone. The most suitable extraction time was at 10 hours as the increase of yield of oleoresin, zerumbone and curcumin after 10 hours is insignificant .

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